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NATIONAL DAM SAFETY PROGRAM. UPPER BEAVER POND DAM (VA-04135), --ETC(U)
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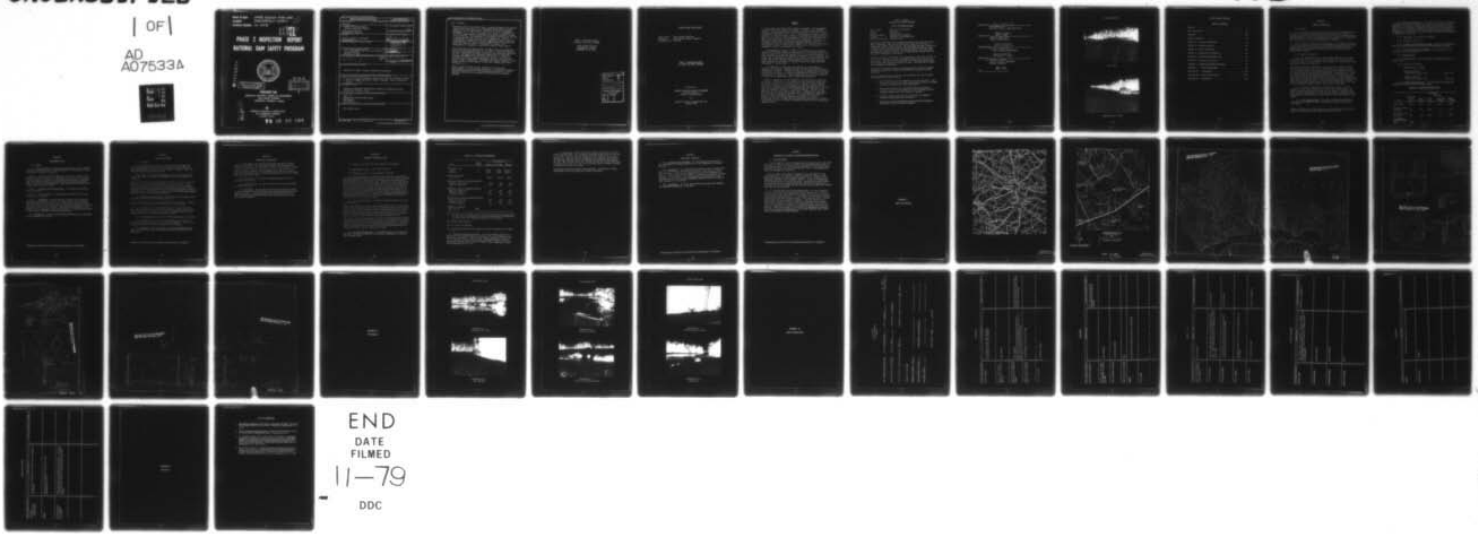

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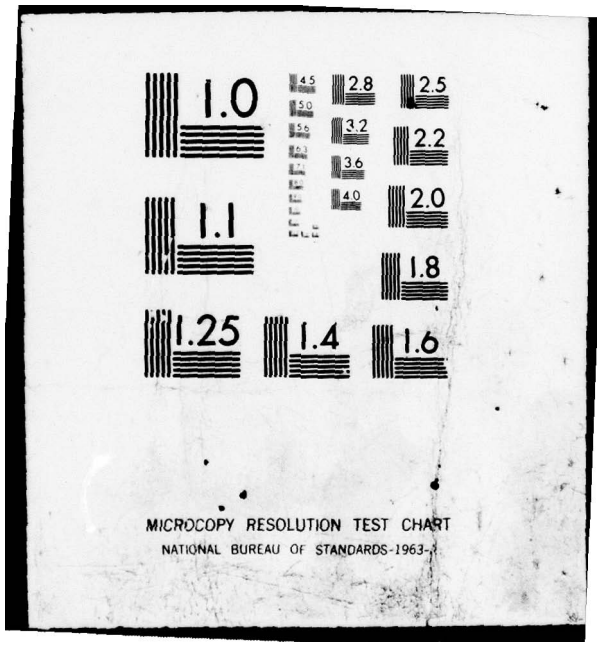
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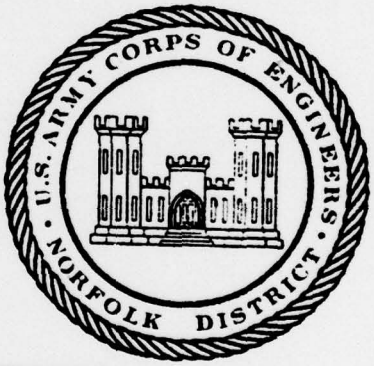
Name Of Dam: UPPER BEAVER POND DAM
Location: CHESTERFIELD COUNTY
Inventory Number: VA. 04135

LEVEL II

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED FOR

NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

BY

DEWARD M. MARTIN & ASSOCIATES
WILLIAMSBURG, VIRGINIA

AUGUST, 1979

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam and appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

UPPER BEAVER POND DAM
CHESTERFIELD COUNTY
INVENTORY NO. VA 04135

MIDDLE JAMES RIVER BASIN

Name of Dam: Upper Beaver Pond Dam
Location: Chesterfield County, Virginia
Inventory No.: VA 04135

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Prepared for

NORFOLK DISTRICT CORPS OF ENGINEERS
803 Front Street
Norfolk, Virginia 23510

by

Deward M. Martin & Associates, Inc.
August 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam:	Upper Beaver Pond Dam
State:	Virginia
County:	Chesterfield
USGS Quad Sheet:	Chesterfield, Virginia
Stream:	Tributary of Falling Creek
Date of Inspection:	June 26, 1979

Upper Beaver Pond Dam is an earthfill structure about 850 feet long and 15 feet high. The dam is classified as small in size with a significant hazard classification. The principal spillway consists of a concrete riser structure with two 66-inch diameter concrete pipes running from the riser structure through the dam to the Lower Lake. The emergency spillway consists of a V-shaped grass channel 100 feet wide and 1 foot deep at the center.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood is the 100-year flood. The spillway will pass 86% of the Spillway Design Flood and the SDF will overtop the dam by 0.2 feet. The spillway is therefore adjudged as inadequate.

The visual inspection revealed no obvious serious problems; however, insufficient geotechnical data were available to evaluate the dam stability.

It is recommended that within the next 12 months the owner perform the following remedial measures:

1. Repair the holes in the embankment near the sewerline. Construction records of the sewer installation should be reviewed to allow an evaluation of piping potential.

2. Secure the services of a specialist (Horticulturist) to evaluate the root characteristics of the existing trees to determine whether the trees should be removed.

3. Conduct a stability analysis to determine the embankment stability during high pool conditions.

4. Institute an annual maintenance and inspection program to detect and correct potential problems.

Prepared By: Paul Seiler
PAUL SEILER, P.E.
Deward M. Martin & Associates, Inc.

Submitted By: Original signed by JAMES A. WALSH
JAMES A. WALSH, P.E.
Chief, Design Branch

Recommended By: Original signed by: Carl S. Anderson, Jr.
for JACK G. STARR, P.E.
Chief, Engineering Division

Approved By: Original signed by: LTC Leonard C. Gregor
for DOUGLAS L. HALLER
Colonel, Corps of Engineers
District Engineer

Date SEP 27 1979

UPPER BEAVER POND

Top of Dam

Downstream Face of Dam

UPPER BEAVER POND DAM

TABLE OF CONTENTS

SECTION 1

PROJECT INFORMATION

1.1 General:

1.1.1 Authority: Public Law 92-367, 8 August 1972 authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams through the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Appendix IV, Reference 1). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Upper Beaver Pond Dam is an earth embankment about 850 feet long and 15 feet high.* The top of the dam is 15 feet wide at an elevation of 185.0 feet m.s.l. Both upstream and downstream slopes are 3(H):1(V).

The principal spillway consists of a concrete riser structure 20 feet wide and 10 feet deep. The crest elevation of the spillway is 180.0 at the furthest edge from the dam and is gradually raised to 181.0 at the closest edge to the dam (See Photograph No. 3, Appendix II). Water is carried from the riser structure through the dam to the lower lake by means of two 66-inch diameter concrete pipes. A 24-inch diameter pipe at the base of the riser structure is capable of lowering the reservoir level to elevation 170.5. The emergency spillway is a 100-foot wide V-shaped grass channel with a crest elevation of 184.0. The sides of the emergency spillway channel have slopes of 50(H):1(V).

1.2.2 Location: Upper Beaver Pond Dam is located 2.6 miles southwest of the intersections of U S Route 360 and State Route 150. From that intersection take U S 360 west 2.4 miles to Lockshire Drive. Take Lockshire Drive north 1.2 miles to Lake Bexley. The dam is 300 feet north of Lockshire Drive. The reservoir is locally known as Lake Bexley.

1.2.3 Size Classification: The dam is classified as small in size because of height (15 feet) and maximum storage capacity (340 acre feet).

*Height is based on the difference in elevation between the top of the dam and the streambed at the downstream toe of the dam.

1.2.4 Hazard Classification: This dam is located in a suburban subdivision and severe flooding could possibly cause heavy damage therefore, it is given a significant hazard classification in accordance with the guidelines contained in Section 2.1.2 of Reference 1, Appendix IV. The hazard classification used to categorize dams is a function of location only and has nothing to do with their stability or probability of failure.

1.2.5 Ownership: Mr. Wallace H. LaPrade

1.2.6 Purpose: Recreation

1.2.7 Design and Construction History: The dam was designed in 1967 by LaPrade Brothers, Civil Engineers in Richmond, Virginia.

1.2.8 Normal Operational Procedures: The regulation of the reservoir level is automatic.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 1.79 square miles.

1.3.2 Dischare at Dam Site:

Maximum Flood - Unknown

Principal Spillway
pool level at top of dam . . . . . 687 c.f.s.

Emergency Spillway
pool level at top of dam . . . . . 60 c.f.s.

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

Table 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet m.s.l.	Reservoir Capacity Area acres	Acre feet	Watershed inches	Length miles
Top of Dam	185	41	340	3.6	0.76
Emergency Spillway Crest	184	39	300	3.1	0.67
Principal Spillway crest	180	31.5	160	1.7	0.64
Streambed at the toe of the dam	170±	--	--	--	--

SECTION 2

ENGINEERING DATA

2.1 Design:

2.1.1 Design Drawings: This dam was designed in 1967 by LaPrade Brothers, Civil Engineers, Richmond, Virginia. A copy of the design drawings is included in Appendix I

*2.1.2 Geologic Setting of the Dam: The dam is located in the Piedmont Geologic Region. The underlying bedrock is the Petersburg Granite, which is a Paleozoic or Precambrian Foundation of uncertain age. The granite bedrock is typically a gray microcline, biotite granite with seams of granodiorite. Rock outcrops were observed only on the eastern end of the dam.

*2.1.3 Available Geotechnical Data: No previous geotechnical data is available.

*2.1.4 Dam Foundation: No information pertaining to the dam foundation is available.

*2.1.5 Embankment: A review of the available design drawings indicates that the dam is zoned. The inner clayey core is 15 feet wide and extends from the dam crest to a depth about four feet below the bottom of the dam. The upstream and downstream embankment materials are not specified on the drawings. Shallow probes conducted on the downstream face revealed a silty sand material. No strength properties of the various embankment materials are available.

*2.2 Evaluation: There is insufficient geotechnical data available for an evaluation of the dam.

*Information provided by Law Engineering Associates of Virginia.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 26 June 1979 inspection are included in Appendix III. At the time of the inspection the pool elevation was at 180.0 feet m.s.l. which is normal. There are no known previous inspection reports.

*3.1.2 Dam: The embankment appeared to be in very good condition. There was no apparent misalignment, erosion, settlement or sloughing.

*Large trees existed along both downstream abutments. Trees were also observed on the downstream side of the emergency spillway. Small bushes (referred to as Alder Bushes by the owner's representative) were observed near the waterline on the upstream side of the embankment and on the downstream slope at the toe of the embankment near the discharge pipes. In addition, a maple tree was observed on the embankment adjacent to the drop inlet structure.

3.1.3 Appurtenant Structures: Observations of the intake structure were made and no deterioration was noted.

*A sewerline passes beneath the dam toward the left abutment. Several holes 1 to 2 feet deep were observed near the sewer crossing.

3.1.4 Spillway: The two 66-inch diameter concrete discharge pipes which run from the riser structure through the dam appear to be in good condition. These pipes are parallel, approximately 13 feet-6 inches apart, with an invert elevation of 170.0.

3.1.5 Instrumentation: There is no instrumentation on this dam.

3.1.6 Reservoir Area: The area surrounding the reservoir is heavily wooded and slopes gently up from the shoreline. There is no noticeable shoreline erosion or apparent slope failures.

3.2 Evaluation: The dam appears to be in good condition, however, the vegetation (trees and bushes) should be removed from the embankment.

*Information provided by Law Engineering Associates of Virginia.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure: The normal pool storage elevation is 180.0 which is the crest of the principal spillway. The reservoir is used for recreation. The regulation of the reservoir level is automatic as water rises above the spillway crest. The lake can be drained manually through a 24-inch diameter opening at the base of the riser structure, which is operated manually by the use of a handwheel operated sluice gate.

4.2 Maintenance: No routine maintenance program has been scheduled for this dam.

4.3 Warning System: At this time there is no warning system or evacuation plan.

4.4 Evaluation: An extensive operation and maintenance plan is not required for this dam, however, an annual maintenance and inspection program is recommended in order to control vegetation, detect potential problems and insure that the spillways are clear and in good condition.

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: No design data was available for the dam.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: No records were available.

5.4 Flood Potential: The PMF, 1/2 PMF, and 100-year flood were developed and routed through the reservoir by use of the HEC-1 computer program (Reference 2, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's Tc and R coefficients for the local drainage area were estimated from basin characteristics. The rainfalls applied to the developed unit hydrograph were obtained from the U S Weather Bureau Publications, Hydrometeorological Report No. 33 (Reference 3, Appendix IV) for PMP and Technical Paper No. 40 (Reference 4, Appendix IV) for the 100-year flood. Losses were estimated at an initial loss of 1.0 inch and a constant loss thereafter of 0.05 inch/hour for PMF and 1.5 inch initial loss and 0.15 inch/hour constant loss for the 100 year flood.

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water flows from the reservoir, Upper Lake Bexley, over the principal spillway (a concrete riser) to the Lower Lake Bexley when water in the reservoir rises above elevation 180.0. Two 66-inch diameter concrete pipes from the concrete riser run through the dam to the Lower Lake Bexley. Water also flows past the dam over the emergency spillway in the event water in the reservoir rises above elevation 184.0.

The storage curve was calculated by use of U S Geological Survey Quadrangle Maps. Rating curves were developed for the principal spillway, emergency spillway, and non-overflow section of the dam. In routing through the reservoir, it was assumed that the initial pool level was at the principal spillway crest and the flow was routed through the principal spillway and the emergency spillway.

5.6 Overtopping Potential: The probable rise of the reservoir and other pertinent information on reservoir performance is shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

Item	Normal flow	Hydrograph 100-Yr.(d)	1/2 PMF	PMF(a)
Peak flow c.f.s.				
Inflow	2	1,843	5,286	10,571
Outflow	--	1,013	5,232	10,495
Maximum elevation feet, m.s.l.		185.2	186.5	187.6
Principal Spillway (elevation 180.0)				
Depth of flow, feet		5.2	6.5	7.6
Velocity, fps (b)		14.5	14.5	14.5
Emergency Spillway (elevation 184.0)				
Depth of flow, feet		1.2	2.5	3.6
Duration, hours		12	26	39
Velocity, fps (b)		1.5	3.0	4.0
Non-overflow section (elevation 185.0)				
Depth of flow, feet		0.2	1.5	2.6
Duration, hours		5	18	29
Velocity, fps (c)		2.0	5.6	7.3
Tailwater elevation feet, m.s.l.	168±			

(a) The PMF is an estimate of flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the retion.

(b) Normal flow velocity

(c) Critical flow Velocity

(d) The 100 year flood has one chance in 100 of occurring in any given year.

5.7 Reservoir Emptying Potential: A 24-inch diameter sluice gate attached to the concrete riser at elevation 171.5 is available for dewatering the reservoir. The gate will permit withdrawal of about 38 c.f.s. with the reservoir level at the principal spillway crest and essentially dewater the reservoir in about 5 days, assuming an inflow to the reservoir of 2 c.f.s.

5.8 Evaluation: Based on the size (small) and hazard classification (significant), the recommended Spillway Design Flood is 100-year to 1/2 PMF. Based on the risk involved in this project, it is considered that 100-year flood is appropriate as a Spillway Design Flood. The spillway will pass 86% of the 100-year flood without overtopping the dam. The 100-year flood will overtop the dam for 5 hours and reach a maximum of 0.2 feet over the top of the dam, with an average critical velocity of 2.0 feet per second.

Conclusions pertain to present day conditions. The effect of future development on the hydrology has not been considered.

SECTION 6

STRUCTURAL STABILITY

*6.1 Foundation and Abutments: No information was available on the composition or strength properties of the foundation or abutment material.

*6.2 Embankment: The design drawings indicate that an impervious clay core 15 feet wide extends from the crest of the dam to 4 feet below the base. Probes on the downstream face of the embankment indicate a silty sand material, however, no strength properties of these materials are available. The sewerline which was installed in the embankment raises some question regarding stability since no construction information is available.

*6.3 Evaluation: No visual observations were made that indicate the immediate instability of the dam.

*Information provided by Law Engineering Associates of Virginia.

SECTION 7

ASSESSMENT AND REMEDIAL MEASURES/RECOMMENDATIONS

7.1 Dam Assessment:

7.1.1 Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood is the 100-year flood. The spillway will pass 86% of the Spillway Design Flood and the SDF will overtop the dam by 0.2 feet. The spillway is therefore adjudged as inadequate.

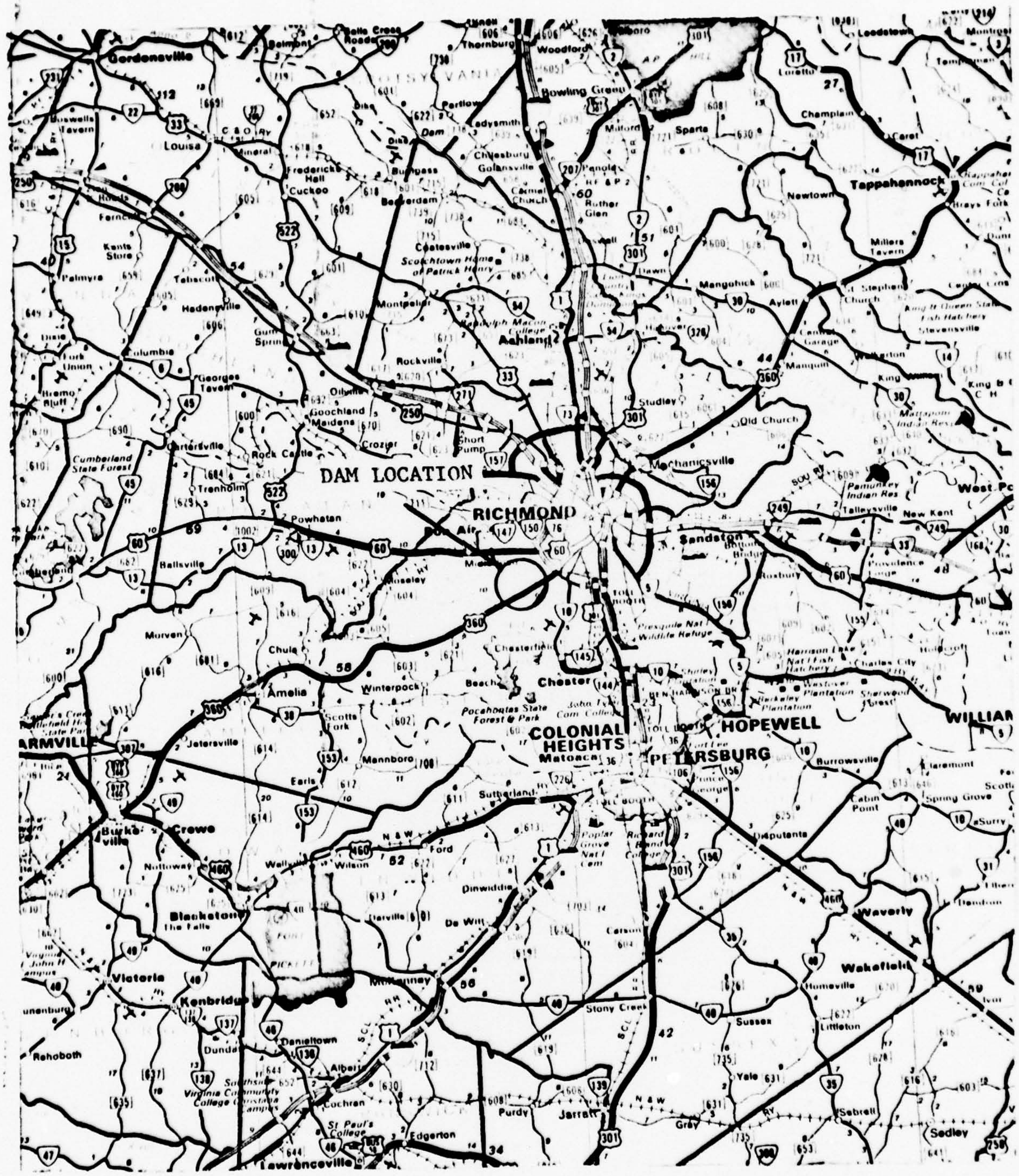
*7.1.2 From a geotechnical standpoint, the dam appears to be functioning well. An analytical stability analysis cannot be made until the composition and strength properties of the foundation and embankment material are determined, however. Also, the consequences of the existing tree roots are not known. Questionable areas include the sewerline which we understand was put in after the dam was constructed and the areas where the holes extend from the dam crest several feet into the core material.

* 7.3 Remedial Measures and Recommendations: It is recommended that the holes near the sewerline be repaired immediately. Construction records of the sewer installation should be reviewed to allow an evaluation of piping potential. A specialist (Horticulturist) should also evaluate the root characteristics of the existing trees to determine whether the trees should be removed. Although there were no indications of slope stability problems with the dam during normal pool levels, stability analyses of the dam embankment and foundation should be conducted to determine the stability during high pool conditions. Annual inspections of the dam are recommended to determine that the spillways and embankments are in good condition and to anticipate any potential piping problems.

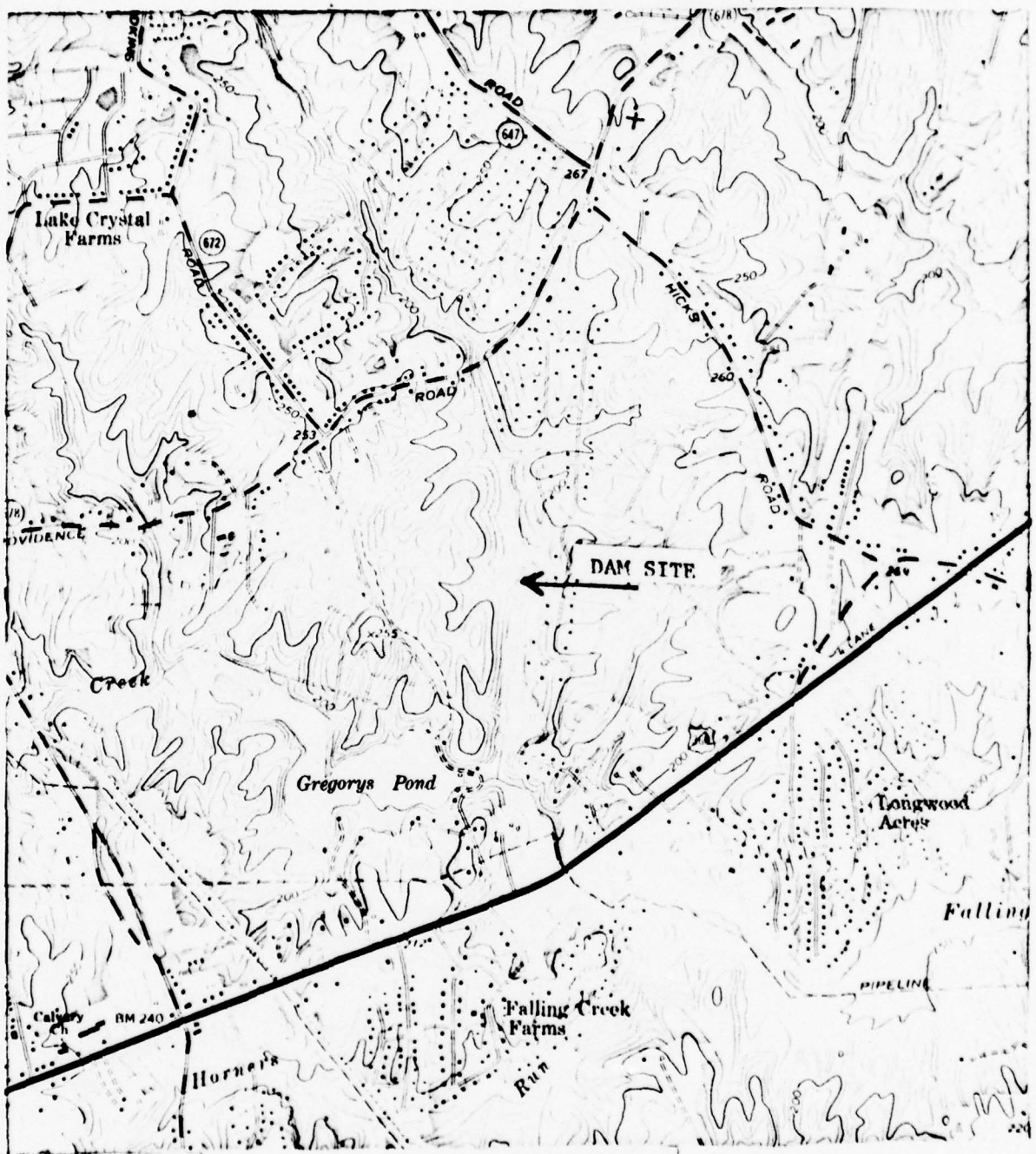
*Information provided by Law Engineering Associates of Virginia.

APPENDIX I

MAPS AND DRAWINGS



REGIONAL MAP
UPPER BEAVER POND



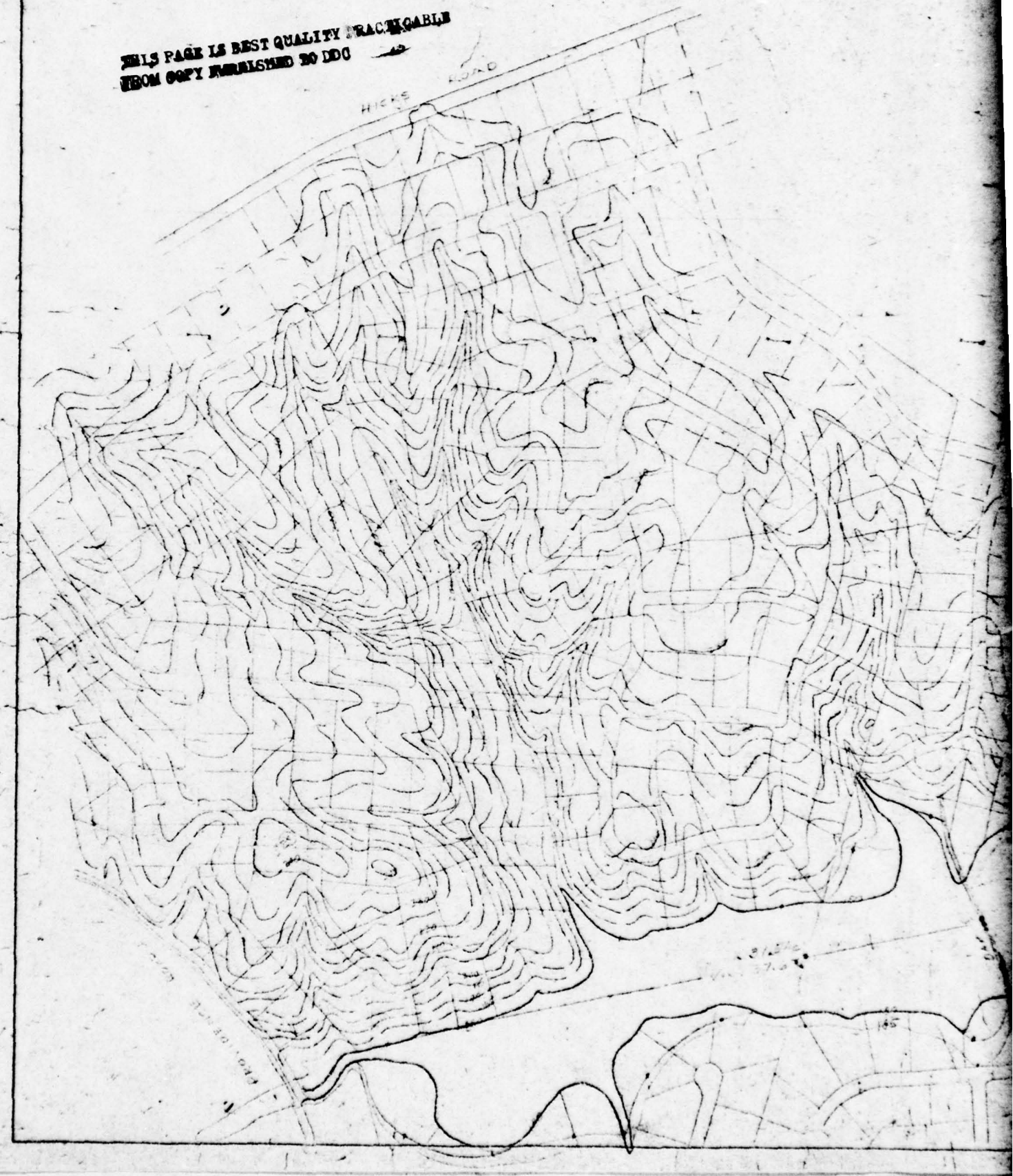
MN
GN
6½°
116 MILS
1°33'
28 MILS

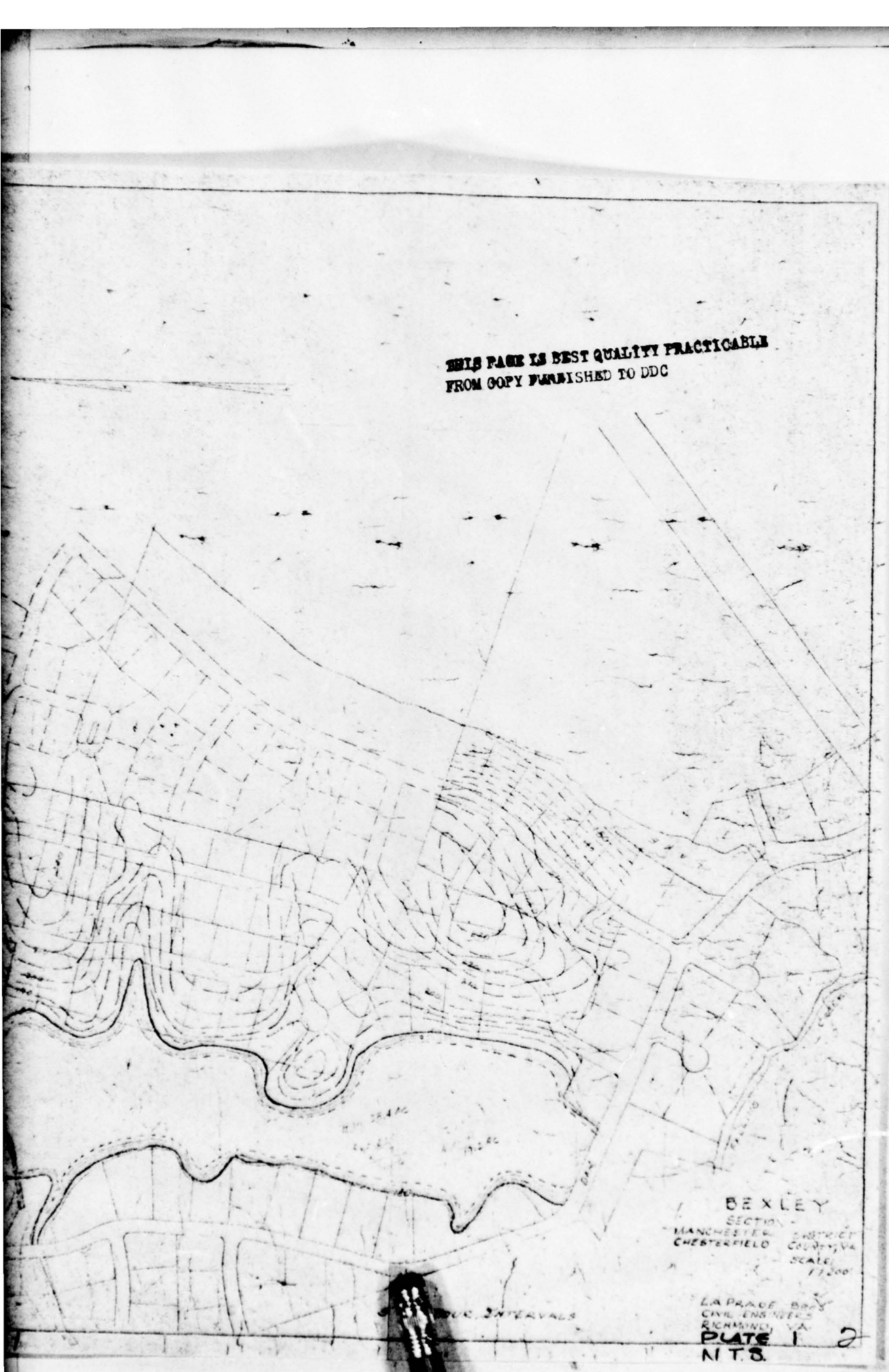
UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

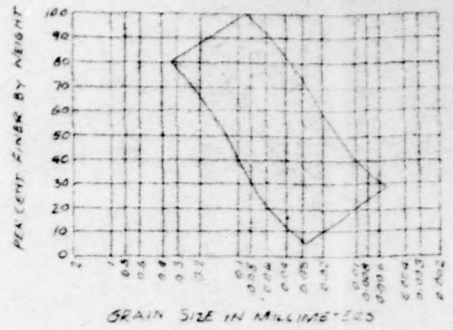
CHESTERFIELD, VA.
N3722.5—W7730/7.5
1963
PHOTOREVISED 1968 AND 1974
AMS 5458 I NE-SERIES V834

SCALE: 1" = 2000'
10' Contours

VICINITY MAP
UPPER BEAVER POND

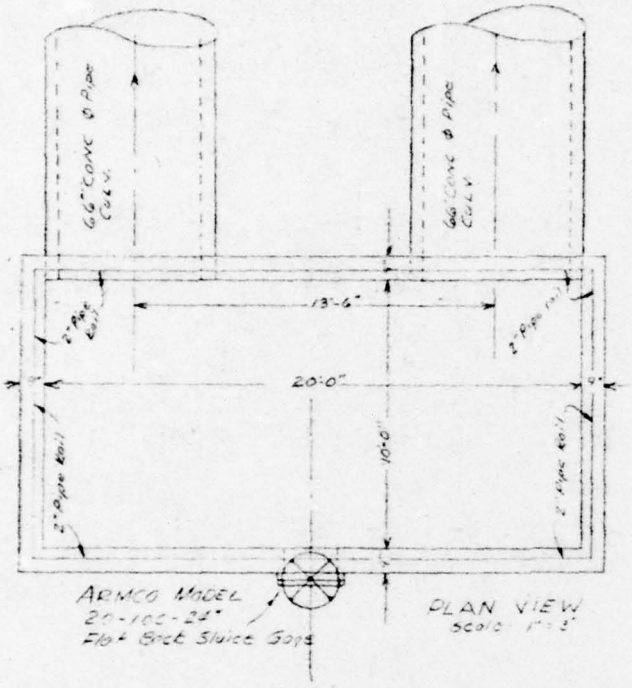






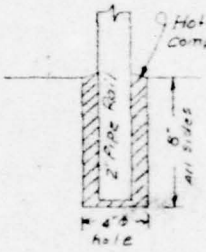
Shaded area is limit of acceptable core material.

Chart showing grain sizes of material acceptable for use in core wall.

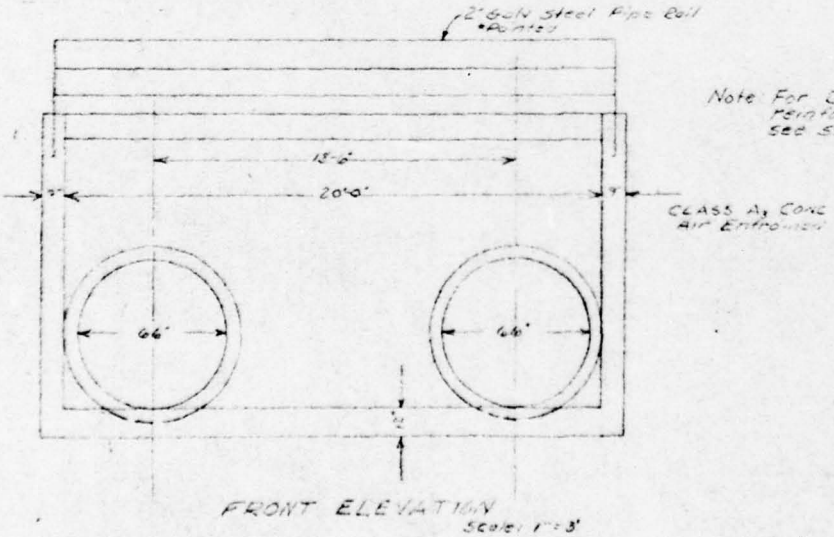


ARMCO MODEL 20'-10C-24" Flat Back Sluice Gate

PLAN VIEW
Scale 1" = 8'

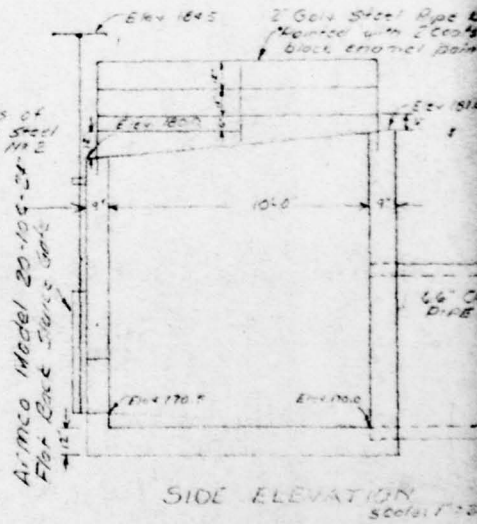


DETAIL - PIPE RAIL MOUNTING
Scale 1½" = 1'

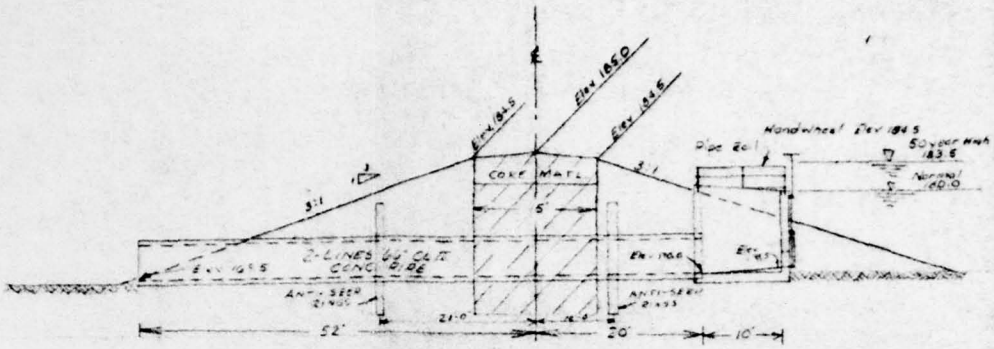


FRONT ELEVATION
Scale 1" = 8'

Note: For Detail of reinforcing steel see Sheet No 2

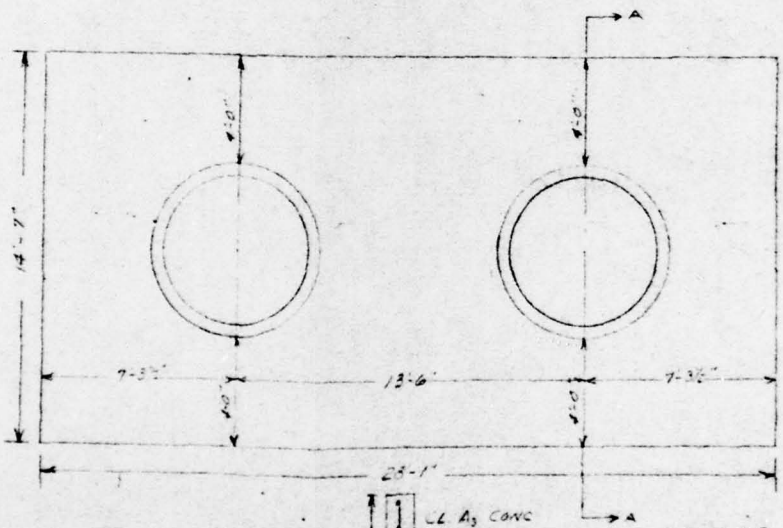


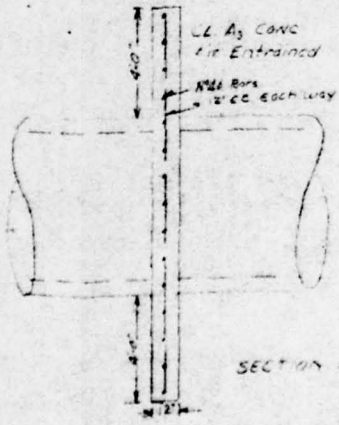
SIDE ELEVATION
Scale 1" = 8'



TYPICAL SECTION
THRU DAM & SPILLWAY

Emergency Spillway





DETAILS
ANTI-SEEP RINGS

SECTION A-A

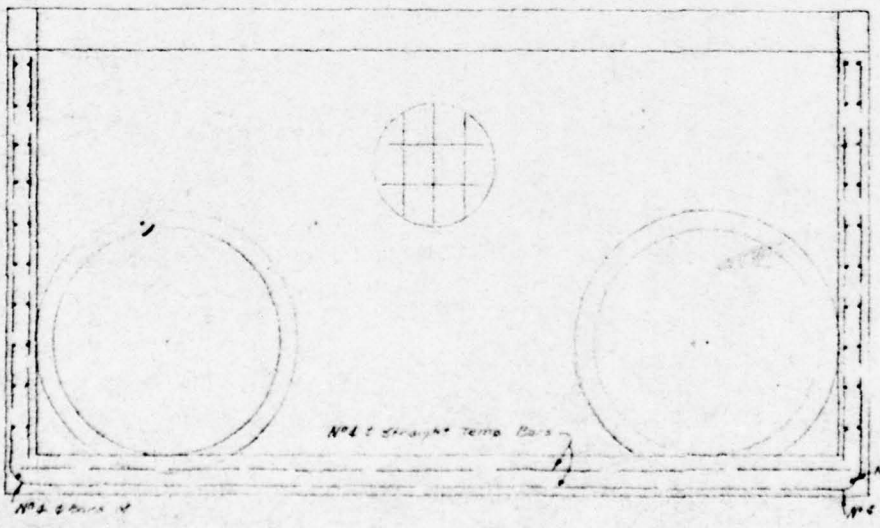
UPPER LAKE
BEXLEY
CHESTERFIELD CO., VA.

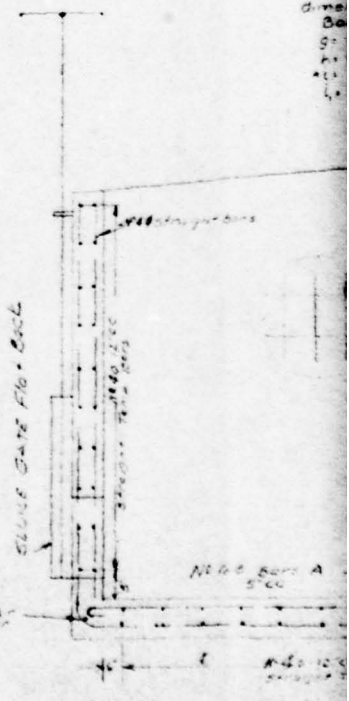
Dec. 4, 1967

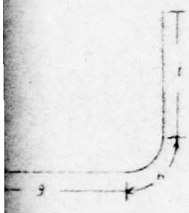
L. & PRADE, BOCK
CIVIL ENGINEERS & SURVEYORS
RICHMOND, VIRGINIA

SHEET 2- 3

PLATE 2 N.T.S.





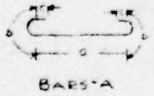


BARS-C

dimensions of bars - Spacing 16 cc
Bars C
g: 5'-11" (allows for overlap & splicing)
h: 9 1/2"
e: 10'
f: 11'
*May be omitted if splice bars added

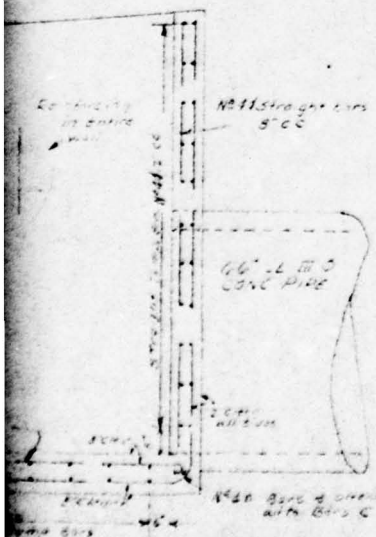
BARS-B

dimensions of bars - Spacing 16 cc
BAR-B
g: 10'-2"
h: 9 1/2"
e: 10'
f: 11'
*This dimension may be changed if splice bars added.



BARS-A

dimensions of bars
Bars A
g: 10'-8"
h: 9 1/2"
c: 8"
Spacing 8 cc



UPPER LAKE
BEXLEY
CHESTERFIELD CO., VA.

Dec 4, 1967

LaPrade, Bass
Civil Engineers & Surveyors
Richmond, Virginia

PLATE 3 N.T.S.
SHEET - S - 3

APPENDIX II

PHOTOGRAPHS

UPPER BEAVER POND

PHOTOGRAPH NO. 1
Upstream Face of Dam

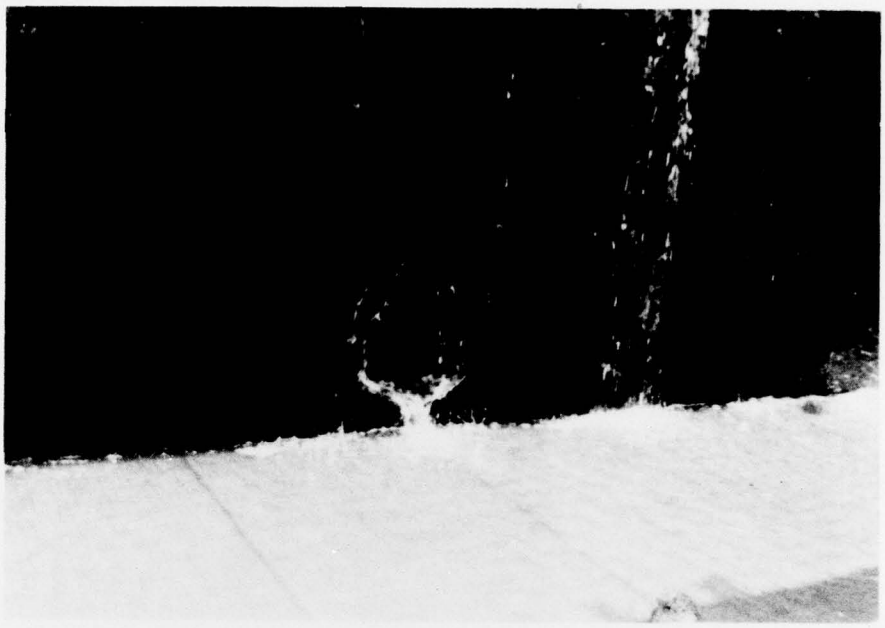
PHOTOGRAPH NO. 2
Left Abutment

UPPER BEAVER POND

PHOTOGRAPH NO. 3
Principal Sipllway

PHOTOGRAPH NO. 4
Outlet of Principal Spillway

UPPER BEAVER POND



PHOTOGRAPH NO. 5
24-inch Opening for Drain

PHOTOGRAPH NO. 6
Downstream

APPENDIX III

FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Upper Beaver Pond Dam County Chesterfield State Virginia Coordinates Lat. 3727.5 Long. 7734.0

Date(s) Inspection 6-26-79 Weather Clear Temperature 65 degrees F

Pool Elevation at Time of Inspection 180 M.S.L. Tailwater at Time of Inspection 168 M.S.L.

Inspection Personnel:

Wallace H. LaPrade , Owner

Curt Linderman, S.W.C.B. John Kemper, Law Engineering

Tan Young, DMM&A

Paul Seiler , DMM&A Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	No cracking at the right abutment. No cracking at the left abutment.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None visible.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None visible. Trees noted in area surrounding both abutments. Holes, 1-2 ft. deep were observed in the area of the sewer line at the east end of the dam.	The Owner stated that these holes resulted from cutting cables during the sewer construction.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No misalignment at the top of dam.	
RIPRAP FAILURES	No riprap visible.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONSTRUCTION MATERIAL		One tree on lower part of downstream bank should be removed.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	None observed.	
ANY NOTICEABLE SEEPAGE	No visible seepage.	
STAFF GAGE AND RECORDER	None.	
DRAINS	No drains were observed during the inspection.	
FOUNDATION		

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	Concrete riser structure 20 feet wide and 10 feet deep. Crest sloped from elevation 180.0 to elevation 181.0. Has 24-inch Ø opening at elevation 170.5 to drain lake.	Good condition.
OUTLET STRUCTURE	Two 66-inch Ø concrete pipes run from the riser through the dam to the downstream channel.	Good condition.
OUTLET CHANNEL	The outlet channel in the natural streambed of the downstream.	
EMERGENCY GATE	24 inch sluice gate.	Plate 2, Appendix I

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete weir is a 10-foot x 20-foot concrete riser submerged for normal pool elevation. Two 66-inch diameter pipes from the riser run through the dam to downstream.	See Plate 2, Appendix I.
APPROACH CHANNEL	Natural Stream.	
DISCHARGE CHANNEL	Natural stream.	
BRIDGE AND PIERS	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are flat, approximately 0.4%	
SEDIMENTATION	*Unknown.*	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	A lower lake impounded by a lower dam is immediately downstream.	
SLOPES	Slopes of the downstream channel are flat, approximately 0.15 %.	
APPROXIMATE NO. OF HOMES AND POPULATION	There are no homes immediately downstream. In about 1.5 miles downstream, there are two homes in Falling Creek Farm and 5 homes in Longwood Acres near the stream.	

APPENDIX IV

REFERENCES

LIST OF REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Department of the Army, Office of the Chief of Engineers, Washington, D.C. 20314.

2. HEC-1, Flood Hydrograph Package, Hydrologic Engineering Center, U S Army Corps of Engineers, Davis, California, 1973.

3. U S Weather Bureau and U S Army Corps of Engineers, "Seasonal Variation of Probable Maximum Precipitation East of the 105th Median for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24 and 48 Hours", Hydrometeorological Report No. 33, Washington, D.C., April 1956.

4. Hershfield, David M., "Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years", Cooperative Studies Section, U S Weather Bureau Technical Paper No. 40, Washington, D.C., 1961.